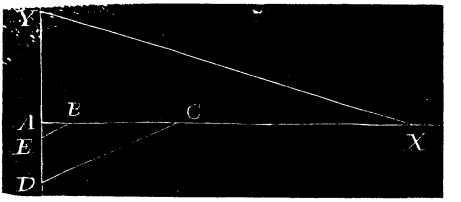
NOTE BY PROF. P. E. CHASE.—To construct π, approximately, draw the rectangular axes AX, AY; make $AX = 60$, and take, on the line AX, $AB = 3$, $AC = 20$. On the axis AY, lay off, negatively, $AD = 9$. Join CD and draw BE parallel to CD; make $EY = AC = 20$ and join XY. Then is $XY \div AC = 3.14158499 = \pi$, very nearly.



[The demonstration, received in answer to query at p. 55, is deferred, for want of room, to a future number.]

PROBLEMS

266. By PROF. J. H. KERSHNER, *Mercersburg, Pa.*—Sum the series,

$$\cos 2\theta \cos \theta + \frac{\cos^2 2\theta \cos 3\theta}{2 \cdot 3} + \frac{1 \cdot 3}{2 \cdot 4} \cos^3 2\theta \frac{\cos 5\theta}{5} + \ldots \text{ to infinity.}$$

267. By WM. HOOVER, *Bellefontaine, Ohio.*—What was the duration of a building and loan association in which, for the first eight years, money was loaned at an average premium of \$45 per share (of \$200), interest paid being 6 per cent.

268. By E. B. OPDYCKE, *Pulaski, Ohio.*—A conical vessel whose upper diameter is a, lower diameter b $(a > b)$ and height h, contains a quantity of water. Find the greatest perpendicular depth of the water when the vessel is so tipped on its bottom as to balance, the vessel being uniform in thickness, and of one material.

269. By GEO. H. HARVILL, *Bonner, La.*—Show that the equations

$$x = (r_1 - r_2)\cos\varphi + mr_2 \cos\left(\frac{r_1 - r_2}{r_2}\varphi\right),$$

$$y = (r_1 - r_2)\sin\varphi - mr_2 \sin\left(\frac{r_1 - r_2}{r_2}\varphi\right),$$

represent the prolate and curtate hypocycloids; and also that when $r_1 = 2r_2$ the curve becomes the ellipse

$$\frac{x^2}{(1+m)^2 r_2^2} + \frac{y}{(1-m)^2 r_2^2} = 1.$$

270. By PROF. E. J. EDMUNDS, *New Orleans, La.*—Find the locus of the centres of circles tangent to a parabola and to the tangent at its vertex.

271. By PROF. J. H. KERCHNER, *Mercersburg, Pa.*—If three points be taken at random in the circumference of a circle, required the probability that the triangle formed by joining them will be acute.

272. By. PROF. W. W. JOHNSON, *Annapolis Md.*—Two lines rotate, uniformly, in opposite directions about two fixed points, the velocity of one being n times that of the other; find the rectangular equation of their intersection.

273. By E. B. SEITZ, *Greenville, Ohio.*—If m and n be the masses of the earth and moon, a the distance between their centers, r the radius of the earth, and if a body fall toward the earth from the point of equal attraction in the line joining their centers, find the time of falling from the hight h to the earth's surface.

274. By PROF. L. G. BARBOUR, *Richmond, Ky.*—Required the shortest distance between two curves whose equations are

$$\begin{aligned} 4x^2+9y^2-144 &= 0, \\ x'^2+y'^2-26x'-32y'+25 &= 0. \end{aligned}$$

275. By Prof. A. HALL, *Washington, D. C.*—Find the moments of inertia of an elliptical disk: (1), about a right line in the plane of the disk and parallel to the axis of x: (2), about a right line parallel to the axis of y, the equation of the disk being

$$ax^2 + 2bxy + cy^2 + 2dx + 2ey + f = 0.$$

QUERY BY W. E. HEAL.—Can an elliptic function of the *third* species be expressed in terms of elliptics of the *first* and *second* species? If so, how?

PUBLICATIONS RECEIVED.

Radiant Points of Meteors. By EDWARD F. SAWYER. From the American Journal of Science and Arts. June, 1879.

The American Journal of Mathematics, Vol II, No. 1. Baltimore, Maryland. March, 1879. 100 pages, 4to.

ERRATA.

On page 83, line 11, for $r \sin\phi$ read, $r\cos\phi$.

" " 87, multiply the formula in lines 2, 6 and 9, from bottom, by the factor π.

" " 108, Fig. 1, insert the letter H between I and C.

" " 111, Fig, 2, for G, read C.

" " 118, F, in the Fig., should mark the intersection with the *arc* AB.